CLAIMS

1. An RF amplifier circuit comprising an RF amplifying device having a first input terminal (E1), a second input terminal (E2) and an output terminal (E3), means for applying to the first input terminal an input RF signal I to be amplified, means for generating and applying to the second input terminal a threshold signal T, and the amplifying device being operable to produce at the output terminal an output signal O which has a high finite value providing a Boolean '1' value when the instantaneous value of the amplitude of I is greater than T and a low finite value providing a Boolean '0' value when the instantaneous value of the amplitude of I is less than T, wherein the threshold signal is dynamically varied in a manner adapted to linearise the relationship in at least part of its range between the amplitude of the output signal O and the amplitude of the input signal I.

2. An RF amplifier circuit according to claim 1 wherein the means for generating and applying a threshold signal T is operable to apply a non-constant transfer function to a signal representative of the input signal.

3. An RF amplifying circuit according to claim 1 or claim 2 and which has a bandwidth of at least five times, preferably at least ten times, greater than the mean operating frequency of the signal which it is operable to amplify.

4. An RF amplifier circuit according to claim 1, claim 2 or claim 3 and wherein the output terminal is connected to a low pass filter operable to filter out harmonics higher than the first harmonic in the output signal O.

5. An RF amplifier according to any one preceding claim and wherein the threshold signal T is controlled to be a variable signal having a constant sign.

6. An RF amplifying circuit according to any one of the preceding claims and wherein the threshold signal T is in operation dynamically varied as a function of the input signal I by sampling the input signal I prior to application to the amplifying device, the means for generating the threshold signal T including a feed forward loop which includes means for deriving at least part of the threshold signal T from the sampled input signal I.

7. An RF amplifying circuit according to any one of the preceding claims and wherein the threshold signal T is in operation dynamically varied as a function of the output signal O by sampling the output signal O produced by the amplifying device, optionally after further processing, the means for applying the threshold signal T including a feedback loop which includes means for providing as the threshold signal T a signal derived at least in part from the sampled output signal O.

8. An amplifier circuit according to any one of the preceding claims wherein the means for providing the threshold signal T is operable to produce from the sampled signal or signals a signal which is related to the envelope of the sampled signal.

9. An RF amplifying circuit according to any one of the preceding claims and wherein the means for generating the threshold signal T includes a digital signal processor operable to calculate from modulation information applied to produce the input signal I a form of the input signal I.

10. An RF amplifying circuit according to claim 8 and wherein the circuit includes a digital signal processor operable to produce modulation information for use in modulation to form the input signal I and also to carry out calculations using the modulation information to derive at least part of the threshold signal T.

11. An RF amplifying circuit according to any one of the preceding claims and wherein the means for generating the threshold signal T includes (i) a signal peak monitor which is operable to measure the value of the peak of a signal being sampled and produces a peak envelope signal, (ii) an A to D (analogue to digital) converter which is operable to digitise the peak envelope signal; a digital signal processor which is operable to apply a transform function to the digitised peak envelope signal; and a D to A (digital to analogue) converter which is operable to convert the digitally transformed signal produced by the digital signal processor back into a waveform suitable for use as the threshold signal T or a component thereof.

12. An RF amplifying circuit according to claim 11 and wherein the means for generating the threshold signal T also includes an amplifier or a plurality of amplifiers to amplify the signal being processed to produce the variable threshold signal T.

13. An RF amplifying circuit according to any one of the preceding claims and wherein the means for generating the threshold signal T is operable to apply proportional, derivative and integral control to produce the threshold signal T.

14. An RF amplifying circuit according to any one of the preceding claims and wherein the means for generating the threshold signal T is operable to apply a transfer function to a monitored signal by use of a look up table held in a memory which stores corresponding values of the signal before and after application of the transfer function.

15. An RF amplifying circuit according to any one of the preceding claims and which is such that a plot of amplitude of the output signal O against amplitude of the input signal I is linear over at least 90% of its range.

16. An RF amplifying circuit according to any one of the preceding claims and wherein the amplifying device employed in the circuit is arranged in a class C configuration modified so that in operation the input signal I and the threshold signal T are applied together via separate input terminals to be combined at a single electrode of the amplifying device.

17. An RF amplifying circuit according to any one of the preceding claims and wherein the amplifying device comprises a solid state amplifying device.

18. An RF amplifying circuit according to any one of the preceding claims and wherein in operation the threshold signal T is applied as a variable bias to the amplifying device or is combined with the input signal I at an input to the amplifying device.

19. An RF amplifying circuit according to any one of the preceding claims and wherein the amplifier circuit includes two or more amplifying devices mutually connected in series or in parallel.

20. An RF communications transmitter which includes an amplifier circuit according to any one of the preceding claims.

21. An RF communications transmitter according to claim 20 and which is incorporated in a mobile station or a base transceiver station for use in a mobile communications system.

22. An RF communications transmitter according to claim 21 and which is incorporated in a mobile station or a base transceiver station for use in a mobile communications system operable to employ phase modulated RF signals.

23. An RF communications transmitter according to claim 22 and which is incorporated in a mobile station or a base transceiver station for use in a mobile communications system operable according to TETRA standards.

24. An RF communications transmitter according to claim 23 and wherein the amplifier circuit is operable to provide a linear response in an output signal strength range of at least 70dB.